

HP StorageWorks Fast Recovery Solutions user's guide

Microsoft Exchange 2000
Microsoft SQL 2000

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part number: B9551-96006

This guide describes how to use fast recovery solutions with
Microsoft Exchange 2000 and Microsoft SQL 2000



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HP StorageWorks Fast Recovery Solutions: User's Guide

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part number: B9551-96006

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About this guide

This guide provides information about configuring and using HP StorageWorks Fast Recovery Solutions (FRS) in a Microsoft Exchange 2000 and SQL 2000 environment. FRS enables quick recovery of Exchange and SQL databases.

FRS combines database recovery features with Business Copy for use with HP disk arrays. FRS uses attributes of Business Copy to stage and manage recovery-ready databases to be used in the event of a catastrophic event. Using FRS, databases can be recovered in minutes rather than the hours typically required for a conventional restore from backup.

Unless otherwise noted, the term *disk array* refers to these disk arrays:

- HP StorageWorks Disk Array XP128
- HP StorageWorks Disk Array XP1024
- HP Surestore Disk Array XP256
- HP Surestore Disk Array XP512
- HP Surestore Disk Array XP48
- HP StorageWorks Virtual Array 7100
- HP StorageWorks Virtual Array 7110
- HP StorageWorks Virtual Array 7400
- HP StorageWorks Virtual Array 7410
- HP StorageWorks Enterprise Virtual Array 3000 (EVA)
- HP StorageWorks Enterprise Virtual Array 5000 (EVA)

Related information For information about the disk arrays, please refer to the owner's manuals.

Prerequisite information

The instructions in this guide are intended for system administrators who have the following skills and knowledge:

- A background in direct access storage device subsystems and their basic functions
- Familiarity with disk arrays and RAID technology

FRS configuration requires an understanding of how to configure LUNs. If you need additional expertise in configuring the array,

consulting services are available from HP. Contact your HP representative.

- Familiarity with the server operating system, including commands and utilities
- Familiarity with Exchange 2000 administration
- Familiarity with SQL 2000 administration
- Familiarity with related disk array management software programs:

HP StorageWorks Business Copy XP
HP StorageWorks Business Copy VA
HP StorageWorks Continuous Access XP
HP StorageWorks CommandView XP
HP StorageWorks CommandView SDM
HP StorageWorks CommandView EVA
HP StorageWorks RAID Manager Library
HP StorageWorks Secure Path

For information about related products, see the HP web site (www.hp.com) for related documentation:

HP StorageWorks LUN Configuration Manager XP: User's Guide

HP StorageWorks Business Copy XP: User's Guide

HP StorageWorks Business Copy Virtual Array: Installation and User's Guide

For Exchange 2000 and SQL 2000 information, see the Microsoft web site:

www.microsoft.com

Terminology

A more comprehensive glossary can be found at the end of this manual.

BC	HP StorageWorks Business Copy XP. Software that creates and maintains local copies of data stored on the disk array. The copies can be used for data duplication, backup, and local disaster recovery.
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CA	HP StorageWorks Continuous Access XP. Software that creates and maintains remote duplicate copies of data stored on the local disk array. The copies can be used for data duplication, backup, and disaster recovery.
cluster	The concept of linking individual servers physically and programmatically and coordinating communication between them so they can perform common tasks.
failover	The process that automatically shifts the workload from one server in a cluster to another server in the event of a failure.
P-VOL	The primary or main volume that contains the data to be copied
production server	Exchange 2000 or SQL 2000 server.
recovery server	FRS server. The server where copies of the production database are staged and managed and that runs the FRS GUI.
S-VOL	Secondary or remote volume. The copy volume that receives the data from the primary volume.
Snapclone	Secondary copies of the databases that are created using the EVA storage appliance.

Disk array firmware and software dependencies

The features and behavior of FRS depend on the disk array firmware and RAID Manager Library versions. This guide describes FRS behavior based on features implemented in the latest disk array firmware and RAID Manager Library versions.

Product	Version
XP256	52.48.06 or later
XP48/XP512	01.12.18 or later
XP128/XP1024	21.01.24 or later
RAID Manager Library XP	01.04.02 or later
VA7100/VA7400	HP13 or later
VA7410	A00 or later
EVA	VCS 3.01.00

Technical support

For the most current information about related products, visit the support web site:

XP www.hp.com/support/stressfree

VA www.hp.com/support/mss

EVA h18000.www1.hp.com/products/storageworks/enterprise/index.html

For information about product availability, configuration, and connectivity, consult your HP account representative.

Revision history

December 2001	First release for Microsoft Exchange 2000.
February 2002	Revised for version 1.01. Included new GUI features. Expanded VA information. Removed examples 1 and 2; replaced with example of four storage groups with four databases each. Removed “Troubleshooting setup” section. Added errors 2401 to 2412.
July 2002	Revised for version 1.02. Included new GUI features, cluster support, and database integrity checking. Removed HORCM file dependency.
September 2002	Revised for version 1.03. Included new GUI features, one-to-many functionality, remote copy creation for XP disk arrays. Added CLI functionality. Added support for the VA7410 disk array. Revised for version 1.00 of FRS for SQL 2000.
December 2002	Revised for version 1.03.01. Includes support for EVA.
April 2003	Revised for version 1.04. Added log replay feature for Exchange 2000. Includes support for multiple Exchange 2000 databases on one LUN.
June 2003	Revised for version 2.0. Integrated FRS for Exchange and SQL Added CA functionality for SQL 2000 Added functionality for one SQL 2000 database across multiple LUNs. Added CLI functionality for SQL 2000
November 2003	Revised for version 2.01.00.

February 2004

Revised for version 2.02.00.

Added information about Instant-On feature
(60-day free trial)

Added mount point support

Warranty statement

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Fast Recovery Solutions features

HP StorageWorks Fast Recovery Solutions (FRS) for Exchange 2000 and FRS for SQL 2000 provides these features:

- support for HP StorageWorks disk arrays, including the EVA, XP, and VA product families
- fast recovery of large Microsoft Exchange 2000 and SQL 2000 databases
- simultaneous recovery of multiple databases
- lowest possible downtime during a corruption and database recovery
- recovery to the last backup
- support for mount points for FRS-managed recovery volumes. FRS 2000 version 2.02 supports the use of mount points as FRS recovery LUNs. Recovery LUNs with drive letters will continue to be supported, as well as combinations of mount points and drive letters
- database integrity checking
- can be used with multiple backup utilities
- a single FRS server supports multiple production Exchange 2000 or multiple SQL 2000 servers
- supports Microsoft cluster in active-passive configuration

- CLI features, including split mirror backup, integrity checking, and remote copy creation
- remote copy creation and maintenance through the use of Continuous Access software with XP disk arrays
- Instant-On feature, which allows you a 60-day trial use of the software. At the end of the 60-day trial period, you must purchase a license for the product to keep working. The license is available from your HP representative.

FRS for Exchange 2000

For Exchange 2000, FRS provides these additional features:

- supports two backup options:
 - split mirror backup (Exchange database offline during backup, an included feature of FRS)
 - online backup (Exchange server running during backup)
- option to replay logs after a recovery

The FRS concept

FRS is an array-based tool designed to enable fast recovery when Exchange 2000 and SQL 2000 databases are damaged.

FRS stages recovery-ready copies of databases through interaction with Windows 2000, the disk array, and either the Exchange 2000 or SQL 2000 production server. These copies can be used in the event of damage to the production databases.

When a catastrophic event occurs, the Exchange or SQL administrator initiates the FRS process. This process takes the damaged database offline, removes it and inserts the known, good, recovery-ready copy of the database into the production server. It then brings the replaced production database back online, which restores user access.

Actual time to replace the corrupt database with the known, good database varies from under a minute to several minutes, depending on the size of the database and the activity on the servers and disk array.

The required starting point for the process is a good recovery-ready copy of the database, created by FRS.

FRS is valuable to enterprises with high availability requirements for their large, centralized Exchange 2000 or SQL 2000 environments, those seeking to improve the SLA (Service Level Agreement) they are able to offer, or who have experienced significant loss due to downtime of their Exchange 2000 or SQL 2000 databases.

FRS and the total HP high-availability solution

HP provides a total high-availability solution package from high-end storage to software and support. Fast Recovery Solutions is part of the high-availability offering, which includes

- disk arrays
- HP StorageWorks Business Copy XP
- HP StorageWorks Business Copy VA
- HP StorageWorks Business Copy EVA
- HP StorageWorks Continuous Access XP
- HP StorageWorks RAID Manager Library XP
- CommandView SDM
- CommandView XP
- CommandView EVA
- Fast Recovery Solutions
- servers and software
- storage consulting services
- post-sales total solution support

Prerequisites and limitations

This chapter pertains to both Exchange 2000 and SQL 2000. The following items are described in this chapter:

- hardware/software checklist
- FRS architecture (illustrations)
- infrastructure requirements
 - for use with split mirror (offline) backup
 - for use with online backup
- XP LUN configuration
- VA LUN configuration
- EVA LUN configuration
- Windows 2000 disk configuration
- *(Exchange 2000 only)* Exchange 2000 server configuration
- *(SQL 2000 only)* SQL 2000 server configuration
- integrity checking requirements
- remote copy requirements
- limitations

Hardware/software checklist

Required for either Exchange 2000 or SQL 2000

- ☐ disk array
- ☐ *(VA/XP only)* HP StorageWorks Business Copy software
- ☐ *(EVA only)* HP StorageWorks Secure Path software
- ☐ *(VA only)* CommandView SDM
- ☐ *(EVA only)* CommandView EVA
- ☐ *(XP only)* RAID Manager Library
- ☐ Microsoft Windows 2000 Advanced Server
- ☐ Microsoft Windows 2000 service pack 2
- ☐ Tape drive for backup. Not needed if using an offline backup, or if backing up to disk.

Required for FRS for Exchange 2000

- ☐ Microsoft Exchange 2000
- ☐ Microsoft Exchange 2000 service pack 2
- ☐ Backup tool – supports two options:
 - Any online backup utility that interfaces with the Exchange 2000 API
 - An offline “split mirror” backup (function included with FRS)

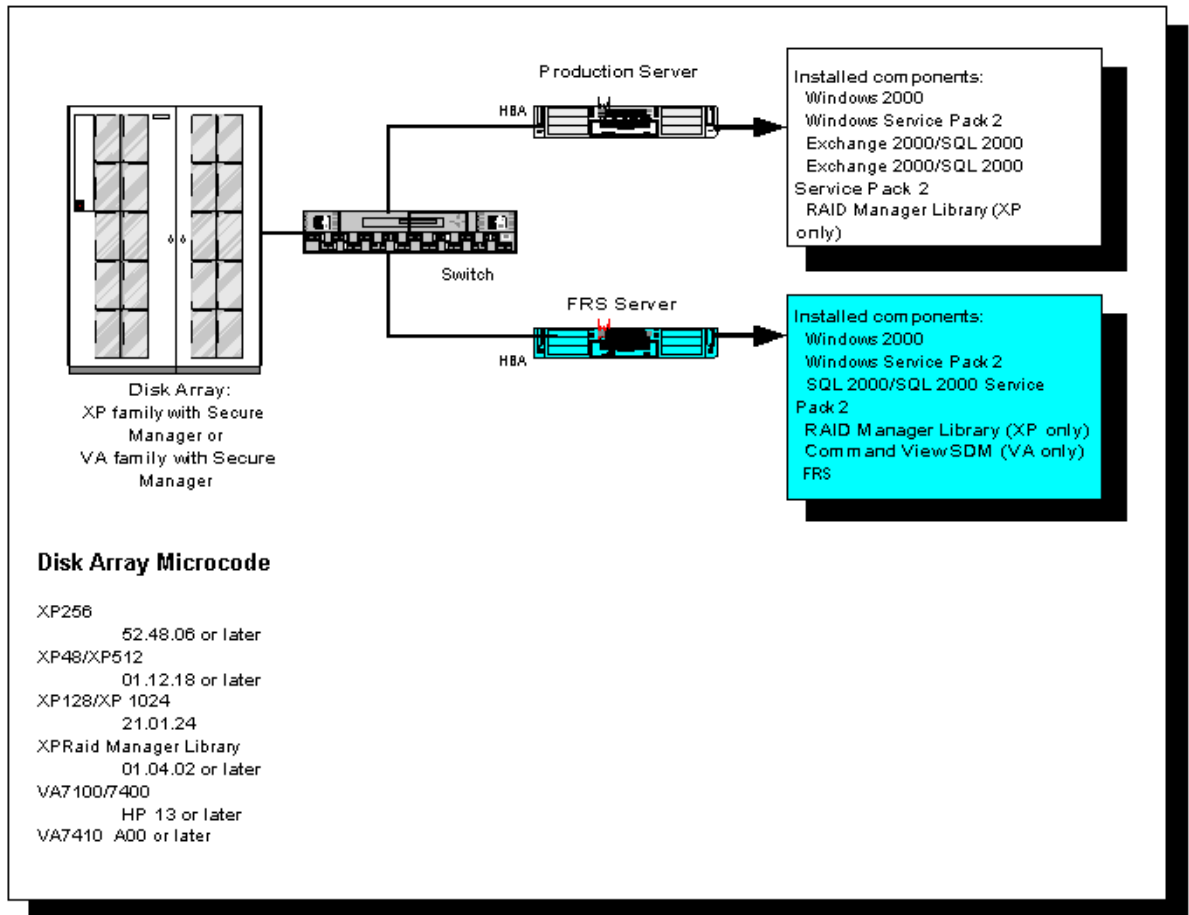
Required for FRS for SQL 2000

- ☐ SQL 2000 server
- ☐ SQL 2000 service pack 3

Server architecture for FRS

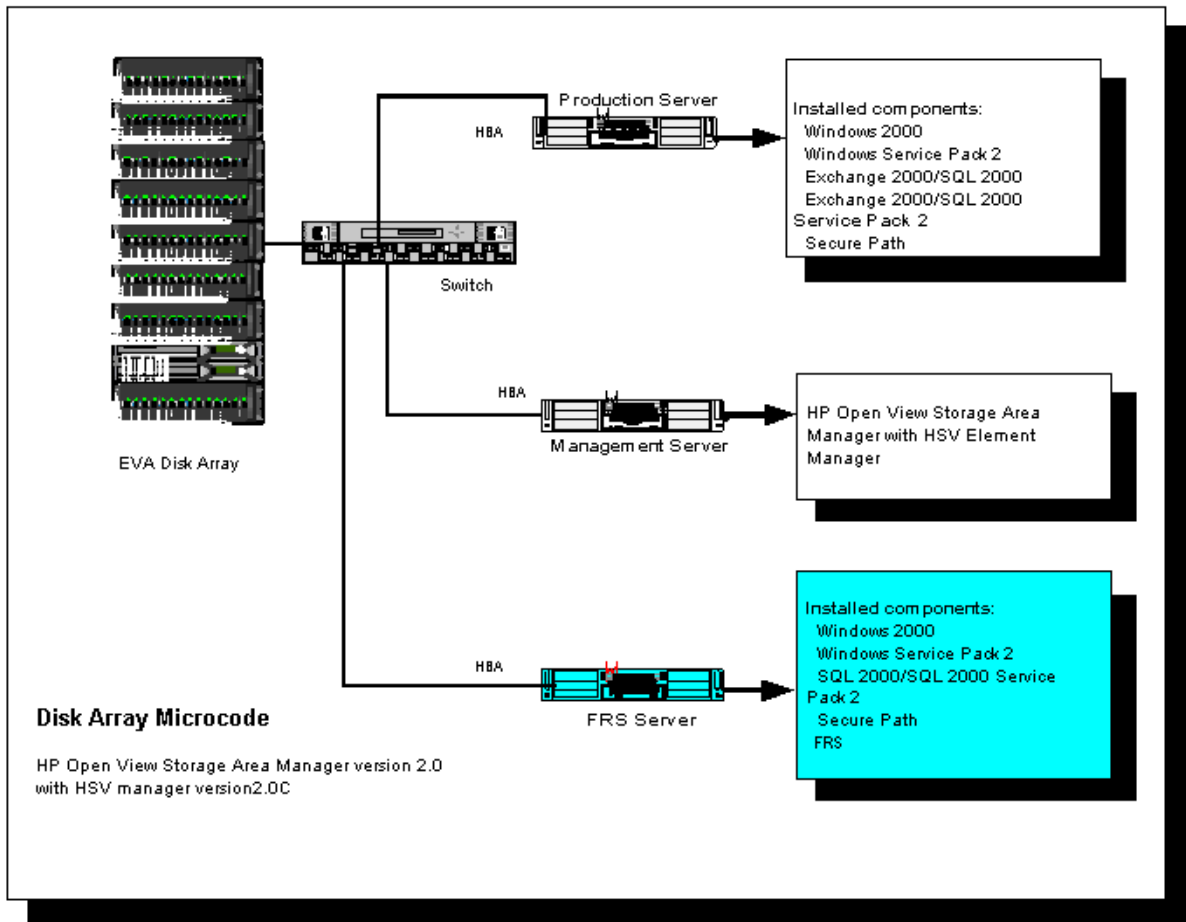
XP or VA disk array

A possible architecture for using FRS with an XP or VA disk array, with disk array microcode requirements, is shown below.



EVA disk array

A possible architecture for using FRS with an EVA disk array is shown below.



Infrastructure requirements

For use with split mirror backup for both Exchange 2000 and SQL 2000

Installation of FRS when using split mirror backup requires one server to act as the recovery FRS management station. The FRS GUI runs from this server to stage the recovery-ready copies of the database to use in the event a fast recovery is needed.

This server can be a standalone workstation, be joined to the production domain, or be a member of its own domain. The only requirement is that it be on the same network as the production servers it will manage. Prepare the recovery server by installing Windows 2000 Advanced Server, Windows 2000 service pack 2, RAID Manager Library (XP only), CommandView SDM (VA only), Secure Manager VA (VA only), Secure Path (EVA only) and the recovery server component of FRS. (More information about installation is in the installation chapter of this manual.)

For a VA disk array, there must be one CommandView SDM management station. Installation of CommandView SDM on the server is not required, provided that there is a management station that has the ability to create and manage the VA disk array LUNs.

For use with online backup (*FRS for Exchange 2000 only*)

FRS requires a separate domain to host the recovery server because duplicate Exchange 2000 servers are not allowed in the same domain. The production domain must already be in place and functioning as an active Exchange 2000 server providing messaging services to customers.

A recovery domain (where FRS works, staging copies of the Exchange 2000 databases for use in the event of corruption of the production databases) must be created.

The recovery domain consists of one server which acts as the Active Directory server, with Windows 2000 Advanced Server, Windows 2000 service pack 2 or later, Exchange 2000, RAID Manager Library (XP only),

CommandView SDM (VA only), Secure Manager VA (VA only), Secure Path (EVA only), the online backup utility being used, and FRS installed.

There are additional benefits to having a separate domain functioning as the FRS recovery domain, such as individual mailbox recovery. These actions are not part of the FRS functionality, but a beneficial side effect of having an Exchange 2000 FRS recovery domain.

XP disk array LUN configuration

LUNs must be configured on the XP disk array for use by the recovery server.

If you use the remote copy option of FRS, use Continuous Access XP to create the pairs (production LUNs paired to remote recovery LUNs). After these pairs are manually created, FRS will see them.

If you are using the integrity check/safe copy feature of FRS, add two recovery LUNs for each production LUN, rather than one. One copy will be used as a recovery-ready, known good database. The other copy will be the “pending” copy. It will have integrity checks run against it before it is promoted to the recovery-ready copy. The roles of these two recovery LUNs flip-flop so that there is always a known good recovery LUN.

In addition, there must also be a small disk designated as the command device. The command device must be a minimum of 36 MB and cannot be a LUSE volume. This is a dual (or more) assigned drive, which controls communication between the disk array and the servers. The recovery server, as well as each of the production Exchange 2000 or SQL 2000 servers, must have access to the command device. Only one command device is needed for multiple exchange servers.

Exchange 2000

For Exchange 2000, each database can reside on its own LUN or all databases can reside within a storage group on one LUN. Recovery server LUNs must be of the same size as the production server LUNs.

Example If all databases in the first storage group reside on one OPEN-M*4 LUN, an OPEN-M*4 LUN for recovery must be created and presented to the recovery server. If each of four databases within the first storage group resides on a separate OPEN-M LUN, four OPEN-M LUNs must be created for recovery and presented to the recovery server.

SQL 2000

For each SQL 2000 production database, there must be a corresponding recovery LUN of identical size. All supported SQL 2000 configurations are supported by FRS as long as all portions of database files and log files reside on a supported HP disk array.

Related information *HP StorageWorks LUN Configuration Manager XP: User's Guide* has information about configuring LUNs.

VA disk array LUN configuration

The following pre-configuration of the VA disk array is required:

For VA disk arrays, you must use CommandView SDM software to create the initial business copies on the recovery server. Assign LUN 0 write-configure access to each of the recovery and production servers. LUN 0 acts as a command device, and FRS cannot function unless all servers have access to it.

Using CommandView, create business copies for each existing production LUN that is to be managed by FRS. If you are using the integrity check/safe copy feature of FRS, create two business copies for each production LUN rather than one.

Security must be enabled. Configure the security table through CommandView SDM so that LUNs are seen only by their correct host. The FRS servers should see only LUN 0 and the business copies. The production server should see only LUN 0 and the production LUNs.

In assigning security, you must use the *node* worldwide name of the HBA. FRS will not function properly if the *port* worldwide name is used.

In the Business Copy screen of CommandView, highlight each newly created business copy and click on Copy From Parent. This action copies the production data onto the recovery LUNs and is the required starting point for FRS.

Creating remote copies is not available feature on VA disk arrays.

Related information *HP StorageWorks Virtual Array: Installation Manual* provides information about configuring the LUNs with CommandView.

EVA Disk Array LUN configuration

Configure LUNs on the disk array for use by the recovery server. For each Exchange 2000 and SQL 2000 production database, there must be a corresponding LUN of identical size for recovery.

If using the integrity check/safe copy feature of FRS, add two recovery LUNs for each production LUN, rather than one. One copy will be used as a recovery-ready, known good database. The other copy will be the pending copy that will have integrity checks run against it before promoting it to the recovery-ready copy. The roles of these two recovery LUNs flip-flop to ensure that there is always a known good recovery LUN available.

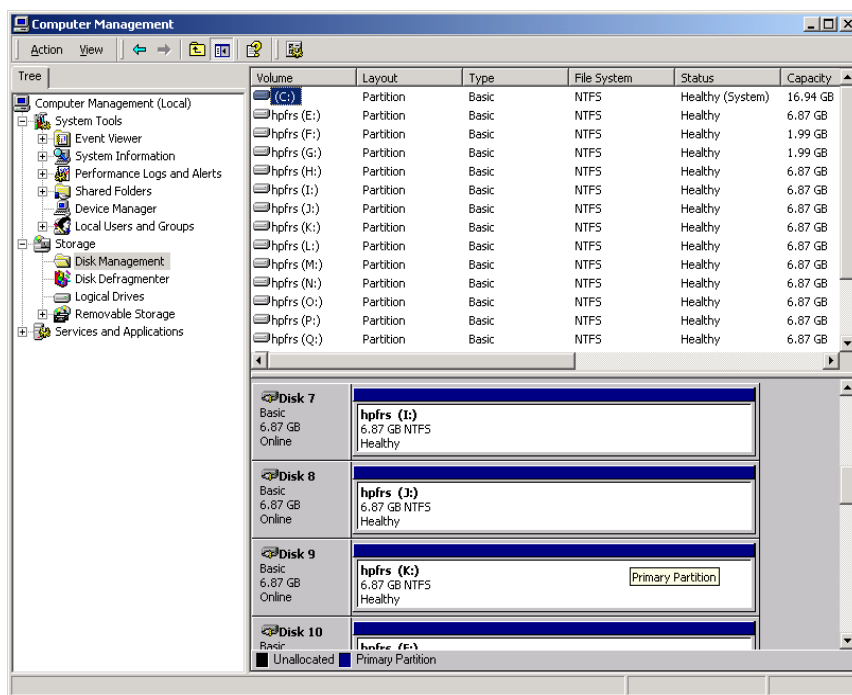
The recovery LUNs may be created by using the Snapclone feature of the EVA array. Again, if you are using the integrity check/safe copy option of FRS, create two Snapclones for each production database. Otherwise, only one Snapclone is required for each production database.

Windows disk configuration for the recovery server

XP family

In disk management, format the newly created recovery LUNs. Disks must remain in basic configuration. Dynamic disks are not supported.

Each disk must be formatted with the volume label **hpfrs** and either a drive letter (as shown below) or as a mount point. This allows FRS to recognize disks you have designated as recovery disks.



If you are using the integrity check/safe copy feature of FRS, you must format two recovery LUNs in this way for each production LUN managed by FRS.

If you are using the remote copy option, use CA to create the local/remote pair. After these pairs have been established, FRS will see them and display

additional GUI features for their management. The remote pair can be created at any time. If pairs already exist, FRS will see them. If pairs are created after FRS has already been installed, a refresh of the GUI will show them.

VA family

Because CommandView SDM was used to make a copy from the parent, when the disks are rescanned, the report shows formatted and labeled disks. No further configuration is needed in Windows.

1. From Window Disk Management on the recovery server, execute a rescan of the disks.
2. Confirm that all Business Copy disks are displayed and have the appropriate format.
3. Confirm that LUN 0 is accessible to all FRS and production servers and has been given write-configure access.

EVA family

The storage appliance has already been used to create either one or two copies of each of the production databases. See “EVA Disk Array LUN configuration” ([page 28](#)). In Windows Explorer, rename the newly created recovery LUNs. Each disk must be renamed with the volume label **hpfrs**. This allows FRS to recognize disks you have designated as recovery disks.

If you are using the integrity check/safe copy feature of FRS, you must rename two recovery LUNs this way for each production LUN managed by FRS.

Exchange 2000 configuration

FRS works with Exchange 2000 in any of storage groups and databases that fall within the supported limits of Exchange 2000. Configurations can range from one storage group supporting one database to four storage groups each supporting four databases.

The streaming and **.edb** files for each database cannot reside on separate LUNs. Each database with its streaming and **.edb** files must reside on one LUN, or multiple databases in a storage group can reside on one LUN.

If multiple databases reside on one LUN, all databases on that LUN must be dismounted for maintenance of any one of the databases.

If log replay is required, the Exchange 2000 databases must have circular logging turned off. FRS cannot replay logs if circular logging is turned on.

Tip If you are creating a separate domain (for example, for an online backup), Exchange 2000 can be configured on the FRS recovery domain as well. This enables other benefits, such as creating further mirrors of the data and individual mailbox recovery. These features are not features of FRS, but would be possible if the FRS recovery domain is a functional Exchange 2000 server. If Exchange 2000 is installed and configured on the FRS recovery server, it must be configured identically to the Exchange 2000 production server.

SQL 2000 configuration

FRS SQL works with SQL 2000 within the supported limits of SQL 2000, except for the following:

- Only the default instance of SQL is supported
- Service pack 3 for SQL 2000 is required for FRS

Requirements for integrity checks

Exchange 2000

The integrity check feature of FRS uses ESEUTIL, a Microsoft Exchange 2000 utility that checks for logical and physical corruption. FRS uses the **ESEUTIL/g** option, which is a reporting tool only. No changes are made to the database in the course of the check. The ESEUTIL files must be moved to the recovery server to enable the FRS integrity check feature.

1. On the FRS server, create an **exchsrvr** folder on the root drive.
2. Within the **exchsrvr** folder, create a **bin** folder.
3. On the Exchange production server, locate the **Exchsrvr/bin** directory. Copy the following files to the newly created **exchsrvr/bin** directory on the FRS server:

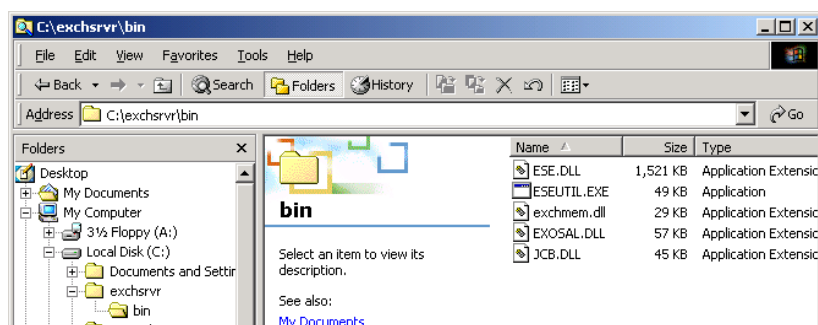
Eseutil.exe

Ese.dll

Jcb.dll

Exosal.dll

Exchmem.dll



Related information Microsoft article Q244525, "How to run ESEUTIL on a computer without Exchange server," outlines the process in detail.

SQL 2000

The integrity check feature of FRS for SQL utilizes DBCC (database consistency check). To use this feature, SQL Server must be installed on the recovery server. If SQL Server is not installed on the recovery FRS server, no integrity check options will appear for those FRS-managed SQL databases appearing in the FRS GUI.

Remote copy requirements for the XP disk array

The remote copy function is available only for XP disk arrays.

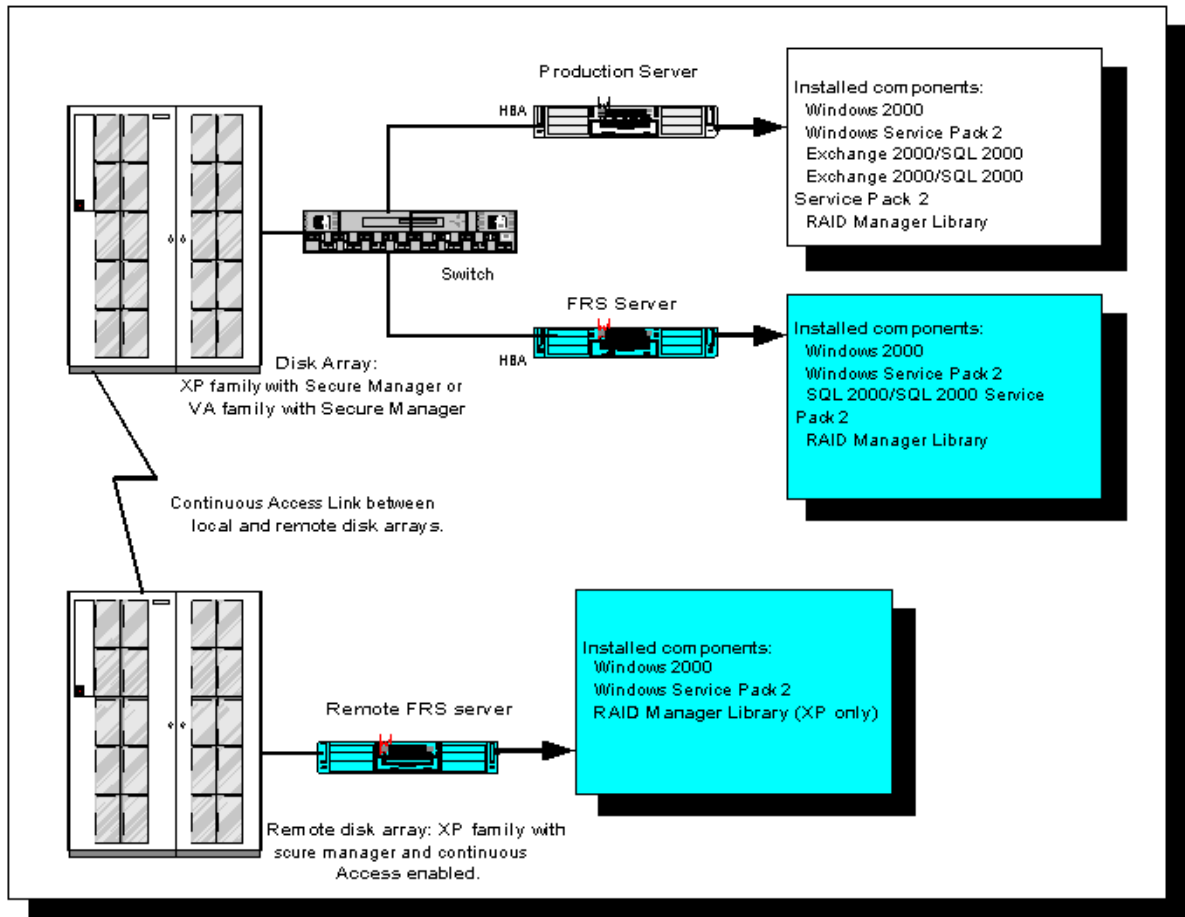
After creating a local recovery LUN, you can create additional copies of the databases on remote disk arrays for disaster recovery purposes. For each local recovery LUN managed by FRS, there can be one remote LUN managed by FRS. The following requirements apply:

- A remote server must be connected to the remote disk array that will host the remote copies
- Both the local and remote disk arrays must have Continuous Access software installed
- The initial pair between the local recovery LUN and the remote recovery LUN must be created manually as a starting point
- A reboot may be required after initial creation of the local/remote pair
- Just as you need to do an initial FRS split mirror backup to the local recovery LUNs, you need to execute an initial FRS split mirror backup to the remote recovery LUNs
- The Remote Copy portion of FRS must be installed on the remote server
- The remote server must have a command device on the array

For information about how to install the remote server, see “Installation” ([page 39](#)).

For information about how to use the remote copy features, see “Using the remote copy feature” ([page 60](#)).

The figure below shows the relationship between the local and remote disk arrays for the remote copy feature of FRS.



Limitations

FRS is supported with Basic disk configuration only. Dynamic disks are not supported. FRS supports a database on a single LUN only. LUSE can be used to create a large LUN; however, spanning LUNs for a single database is not supported.

Only one instance of FRS can be running at any given time on one recovery server. If more than one instance of FRS is running, data can become corrupted (for example, if FRS is running on the recovery server and another administrator uses a remote access tool such as Terminal Services to access the same instance of FRS).

Exchange 2000

FRS works within all the supported limitations of Exchange 2000 with the following exceptions:

- The streaming and **.edb** files must reside together on the same LUN
- Log files cannot reside on the database LUN
- Log replay is unavailable when circular logging is enabled

SQL 2000

FRS works within the supported limitations of SQL 2000 with the following exceptions:

- Only the default instance of SQL is supported
- Service pack 3 for SQL 2000 is required

Windows 2000 WMI

There is currently a known Microsoft issue with Windows WMI query where a WMI query will only return information about 32 disk drives even when more than 32 drives are configured. Until this issue is resolved by Microsoft (as expected with Windows 2000 service pack 4), a hotfix is available on the Microsoft web site to correct it:

<http://support.microsoft.com/default.aspx?scid=kb;en-us;Q320199>.

Installation

Before installing FRS, ensure that the following has been done. If these items are not done, FRS cannot function properly.

- *(XP only)* RAID Manager Library has been installed on both production and recovery servers.
- *(XP only)* Both production and recovery servers have access to a command device on the disk array.
- Exchange mailbox stores/SQL databases with log files reside on the disk array LUNs.
- *(VA only)* Both production and recovery servers have access to LUN zero.
- *(XP only)* Recovery LUNs of appropriate size have been configured with the label **hpfrs**.
- *(VA only)* A CommandView SDM station is set up which gives access to VA LUN management.
- *(VA only)* CommandView SDM has been used to create the initial pair and do an initial Copy From Parent.
- Additional recovery LUNs have been configured for use for integrity checks (if using the integrity check/safe copy feature).

- *(Exchange 2000 only)* ESEUTIL files have been moved to the recovery server (if using the integrity check feature).
- *(SQL 2000 only)* SQL 2000 must be installed on the recovery server (if using the integrity check feature).
- *(VA only)* The security table for the VA is configured using the node worldwide name (use of port WWN is not supported).
- *(XP only)* If you are using a switched environment, Secure Manager is configured for access by hosts to LUNs.
- *(EVA only)* Secure Path is installed on the production and recovery servers.
- *(EVA only)* Network connectivity between the appliance, recovery servers, and all production servers.

Installing the production and FRS servers

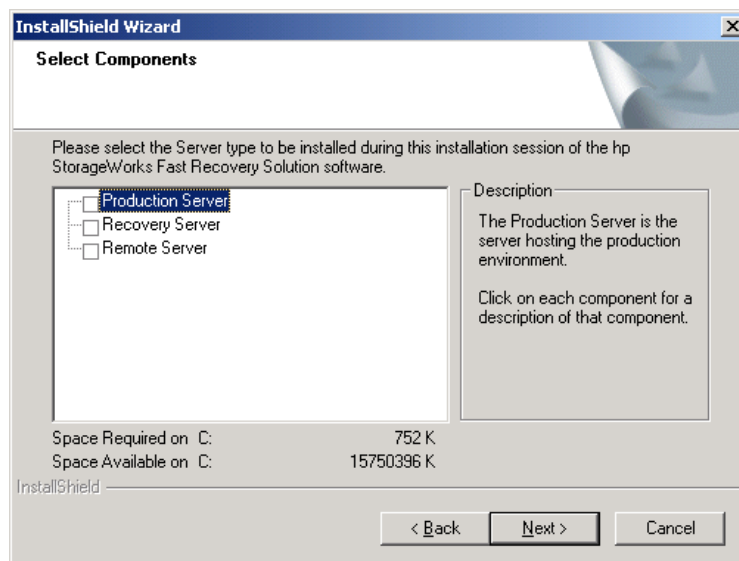
Both Exchange 2000 and SQL 2000

Installation for each server for SQL or Exchange 2000 is identical, with the exception of the Select Component screen. Follow this procedure for each of the recovery, production, and remote servers.

If you are installing FRS into a cluster environment, treat each node as a production server, and install FRS on both nodes.

Open the FRS CD and execute the **setup.exe** file to launch the installation wizard. On the Select Components screen, choose the appropriate component to install: production, recovery, or remote server. In a cluster environment, the production component is installed on each of the cluster nodes.

Exchange 2000



DCOM configuration

FRS offers to launch DCOM Configuration online help before launching DCOM configuration. This facility provides all steps required for configuring DCOM. The online help provides the same instructions with screen examples.

After FRS launches the DCOM configuration properties:

1. Select **hpfrscdo.FrxDiskManager** from the list of applications and open **Properties**.
2. Select the **Security** tab.
3. Select **Use custom access permissions**; then click **Edit**.
4. Click **Add** and scroll down to **Everyone** on the users list.
Click **Add**.
Click **OK**.
Click **OK** again.
5. Select **Use custom launch permissions**; then click **Edit**.
6. Click **Add** and scroll down to **Everyone** on the users list.
Click **Add**.
Click **OK**.
Click **OK** again.
7. Click **Use default configuration permissions** at the bottom of the **hpfrscdo.FrxDiskManager Properties** window.
8. Select the **Identity** tab.
9. Select **This User**.
10. Select **Browser**.
11. Select **Administrator**.
Click **Add**.
Click **OK**.
12. Enter the administrator's password.
13. Re-enter the administrator's password and click **OK**.
14. Click **Add**. Click **OK**.

15. Click **Apply** and **OK** until you exit from the DCOM configuration window.

Upon completion of DCOM configuration, the installer returns to the FRS installation window.

16. Click **Finish** to complete installation.

Repeat this procedure for each production or recovery server.

Uninstalling FRS

Uninstalling FRS can be done in one of two ways: either through using the FRS CD or through Add/Remove Programs in the Windows Control Panel.

With either method, the uninstall script prompts you to remove FRS from the system.

To uninstall FRS with the CD:

Open the contents of the FRS CD. Click **setup.exe** to launch the uninstall script.

To uninstall by using Add/Remove Programs:

From the Start menu, select **Settings**, and open **Add/Remove Programs**. Find the HP FRS entry and select it. Click **Change/Remove** to launch the uninstall script.

Upgrading from a previous version of FRS

If a previous version of FRS was installed, FRS 2.02 will automatically prompt you to do a “modify” upon installation. Doing a modify will retain all previous FRS pairings and recovery-ready status.

If you uninstall the old version of FRS completely before installing FRS 2.02, previous FRS pairs will not be recognized and you will need to do an FRS split mirror backup again to put the databases back into “recovery-ready” status.

If there are no configuration changes to Exchange 2000 or the Windows disk management system, no configuration changes are needed after an upgrade.

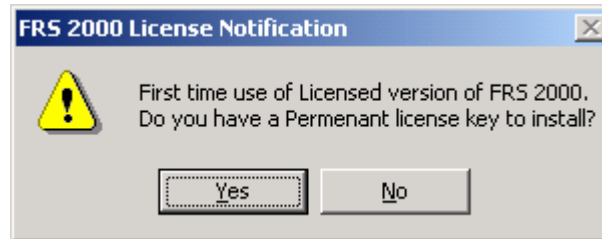
Using FRS

The following items are described in this chapter:

- user interface
- maintenance/using the split mirror backup function
- using the remote copy feature
- checking integrity
- automatic integrity check after split mirror backup
- executing a recovery
- using the Command Line Interface
- options

User interface

The first time FRS is started, the license notification window will appear. Enter “yes” if you have a purchased license, or no to continue using the 60-day trial version of FRS with Instant-On capability.



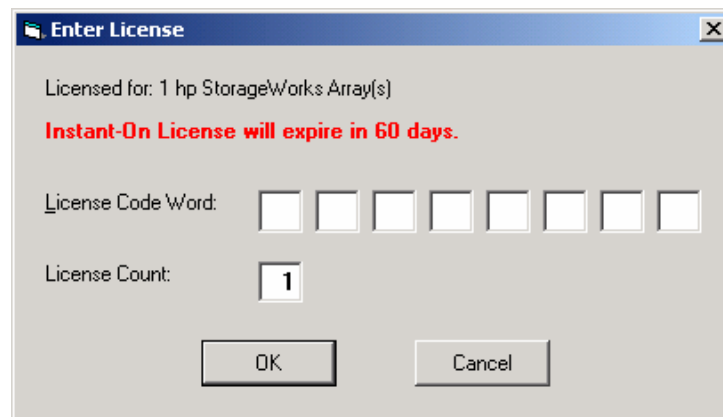
Graphic embedded to get some decent quality. Save from MS Word source file to BMP and import of BMP not effective. This is a direct copy and paste.

If you are using the 60-day Instant-On trial:

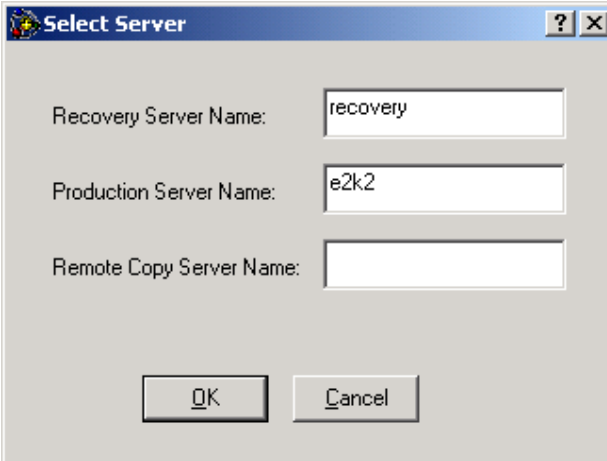
If you are using the 60-day Instant-On trial, click **No**. The Select Server window appears. Continue with step 3 of the procedure below.

If you have a permanent license:

1. If you have a permanent license, click **Yes**. The Enter License window appears.



2. Enter the license code word and click **OK**. The Select Server window appears.

A screenshot of a Windows-style dialog box titled "Select Server". It has a blue title bar with a question mark icon and a close button. The dialog contains three text input fields. The first field is labeled "Recovery Server Name:" and contains the text "recovery". The second field is labeled "Production Server Name:" and contains the text "e2k2". The third field is labeled "Remote Copy Server Name:" and is empty. At the bottom of the dialog are two buttons: "OK" and "Cancel".

Recovery Server Name: recovery

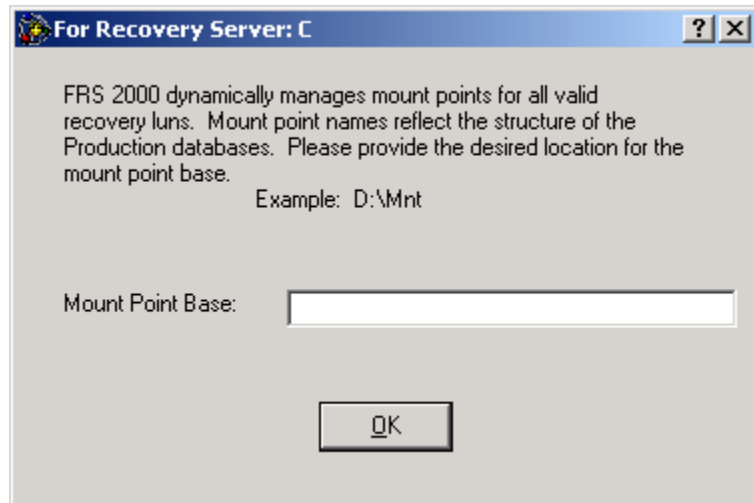
Production Server Name: e2k2

Remote Copy Server Name:

OK Cancel

3. Enter the name of the recovery server.
4. Enter the name of one of the production servers to display the graphical user interface (GUI). If the production server is set up as part of a clustered environment, enter the virtual server name as the production server name.
5. If you are using the remote copy feature of FRS, also enter the name of the remote copy server. If you are not using the remote copy feature, leave this field blank.
6. Click **OK**.

*XP disk arrays only
(optional)*

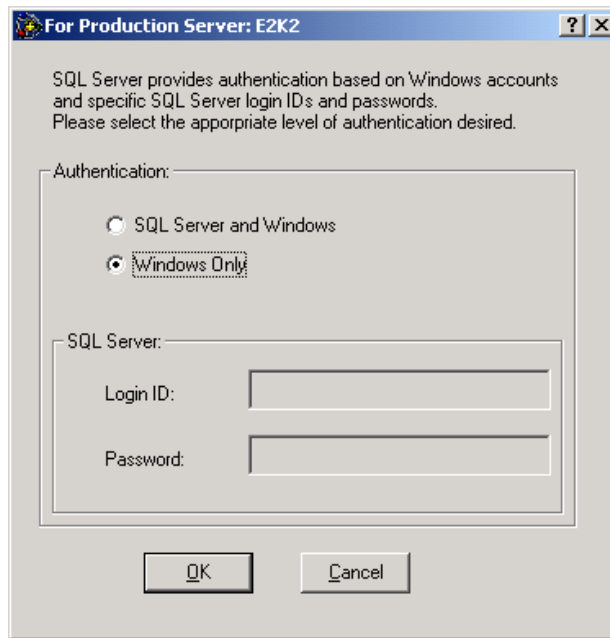


FRS prompts you to enter a “mount point base.” This is the location where FRS keeps track of the servers and databases being managed. The mount point base can be any NTFS formatted drive where mount points can be specified, such as the root drive, or any external storage drive. You must specify a mount point base.

7. Enter a mount point base and click **OK**.

SQL only

An authentication type window appears.

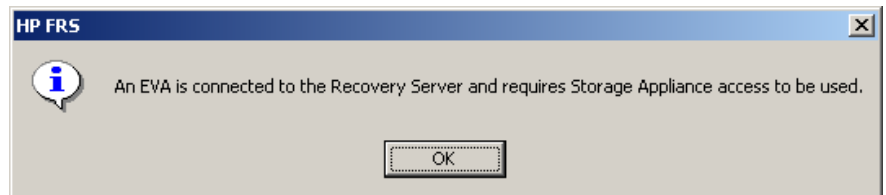


8. Select either “Windows Only” or “SQL Server and Windows” authentication.

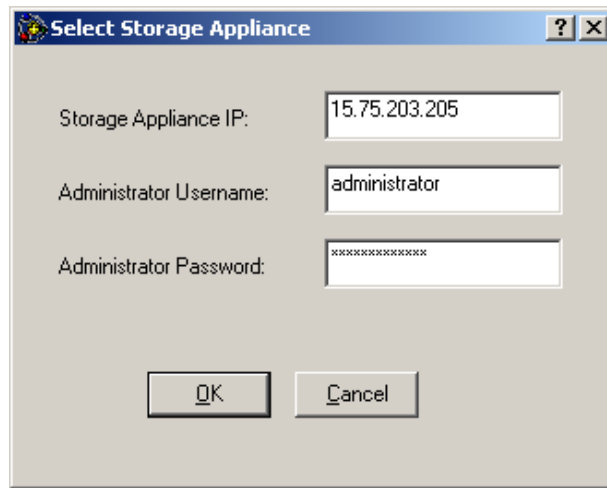
If you select SQL authentication, enter the SQL server login ID and password.

9. Click **OK**.

EVA only For an enterprise Virtual Array (EVA), FRS displays the message:

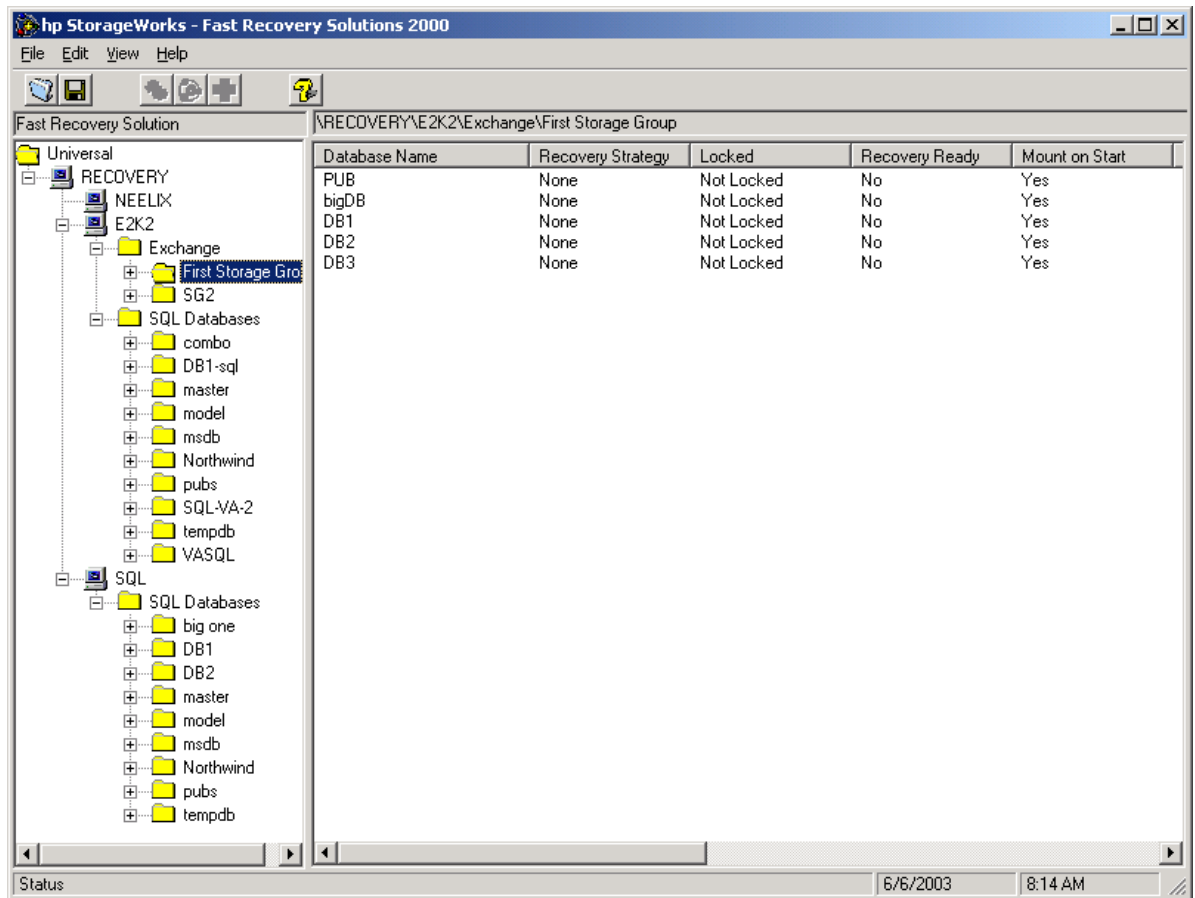


10. Click **OK**. The Select Storage Appliance message window appears.



11. Enter the IP address, administrator user name, and the password for the EVA storage appliance. Click **OK**.

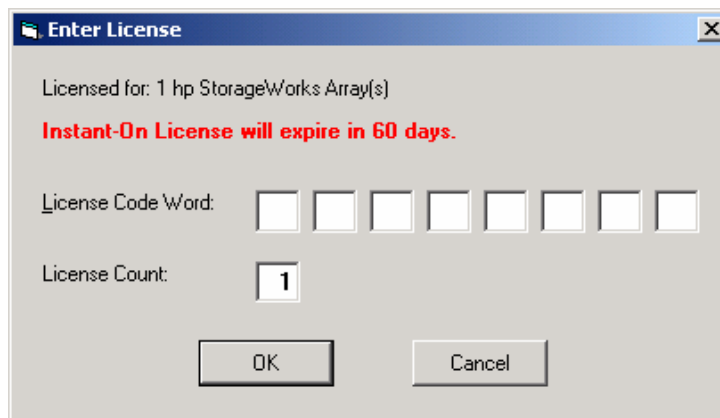
To add more production servers or a remote server to the GUI, select **File > Open server** to access the Select Server screen. The following illustration shows that the remote server “neelix” and the SQL server, “SQL” have been added.



The window displays the production configuration in the left panel. The right panel displays information about any component you highlight in the left panel. When a database is highlighted, (as shown above) information is displayed in the right pane for the database's production and recovery LUNs, as well as date and time information for integrity checks, last backup, and last recovery.

Adding a permanent license for FRS

1. Select **File > Add license** from the FRS main window. The Enter License window appears.



2. Enter the license code word and click **OK**.

~~LicenseAdded.BMP deleted~~

First-time split mirror backups

EVA and XP disk arrays

The first time FRS is installed and started, the Recover button will not be enabled and the database's status displays this message:

```
No Recovery LUN Available
```

You must do a split mirror backup for each database at least once (using FRS) in order for FRS to see a recovery-ready LUN. After this first-time split mirror backup, the you can update the recovery LUN by an online backup, or by continued use of the FRS split mirror backup feature, or by a combination of both.

For information about the Integrity Check box, see “Checking integrity” ([page 63](#)).

VA disk arrays

As described in “VA disk array LUN configuration” ([page 27](#)), CommandView SDM has already been used to create the initial business copy and “Copy From Parent.” Therefore, the databases configuration section of the GUI displays the LUN information from the LUNs that received business copies.

After first opening FRS, the recovery LUN is already designated but does not become recovery-ready until after FRS executes a split mirror backup.

Maintenance/Using the split mirror backup feature

The time required to execute the first-time split mirror backup is longer than the time required for subsequent splits. During the initial split mirror backup with FRS, the pair is created. Subsequent split mirror backups only resynchronize the pair and thus require less time.

Whether using an EVA, XP or VA disk array, the first time FRS is started, you must create a pair affinity for each database. Even if online backups will be used in the course of normal maintenance, this pair must be created once to set up the relationship between production and recovery LUNs (between the primary and secondary volumes). This initial pair must be created by using FRS.

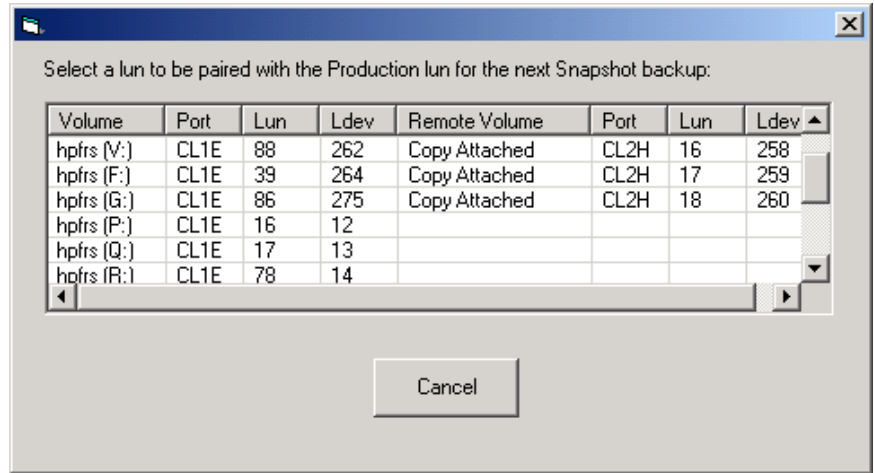
EVA and XP disk arrays

1. Select the database to be backed up on the left panel of the FRS GUI. The Database Configuration section of the GUI displays the production LUN information. The first time that FRS is used, FRS displays this message:

No Recovery LUN Available

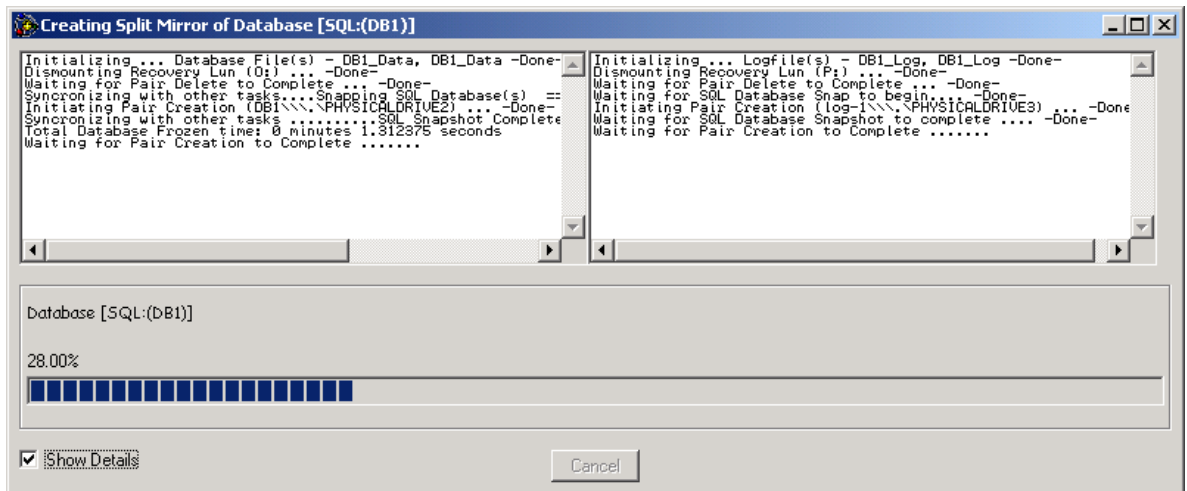
2. Click Split Mirror Backup.

A LUN selection box pops up and prompts you to choose from a list of available like-sized LUNs. This list is based on the LUNs that were previously formatted with the HPFRS label. For XP, the list indicates whether any remote copy is attached. If you choose LUNs with a remote copy, additional GUI options appear to automatically update the remote copy each time a local split mirror backup is executed.

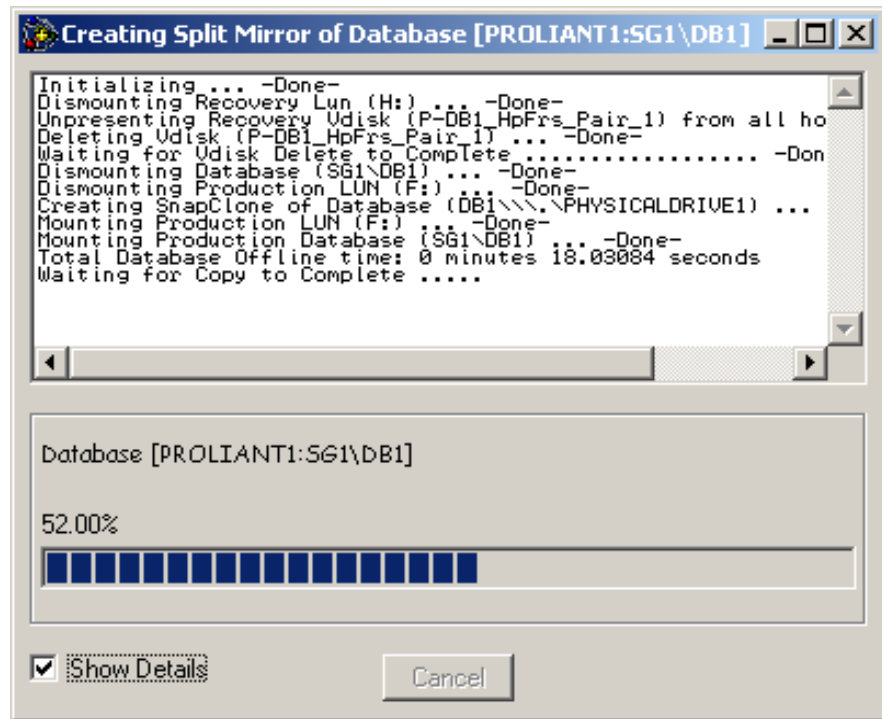


3. Choose one of these possible recovery LUNs. Click **OK** to proceed with the split mirror backup.

The following is an example of the progress window of a SQL 2000 database on an XP disk array: FRS displays the progress of actions as they occur during the pair creation:



The following is an example of the split mirror backup progress window when using an EVA disk array:



Subsequent split mirror backups require no LUN selection because the LUNs have already been designated.

VA disk arrays

For VA disk arrays, CommandView SDM should previously have been used to create the initial business copy and copy from parent. The FRS database configuration section displays information for the Business Copy LUNs.

1. Highlight the database.
2. To start the initial split mirror backup, click **Split Mirror Backup**. The backup proceeds and its progress is displayed in a window.

All Disk Arrays

When the production database is remounted, production is back online and the Exchange 2000 or SQL 2000 databases are accessible by users. The progress window displays how long the production database was inaccessible. The time from initiating the backup to coming back online varies depending on the size of the database, whether an initial setup or subsequent maintenance backup is being performed, and other activity taking place at that time on the array.

You can perform backups on multiple databases by beginning them serially. It is recommended that you limit the number of backup/recovery processes to 5 at one time. Consult your HP representative to optimize performance for your particular configuration.

Perform backups as often as needed and as often as scheduled downtime allows. This serves to create the shortest possible window of potential loss if a corruption that necessitates using FRS to restore data occurs.

If you use the integrity check/safe copy feature of FRS, the integrity check must be viewed by the administrator. If no corruption is detected, accept the result as a good copy.

When the integrity checked version is accepted, it is promoted to recovery LUN status and displayed in the GUI. When a second split mirror backup is done, you need to choose a second LUN. FRS retains the first known, good copy as the recovery LUN until the second LUN's integrity check is viewed and accepted.

If you do not use the integrity check/safe copy feature of FRS (the Integrity Check box is not enabled), only one recovery LUN is consumed per production LUN, and newly backed up LUNs are automatically promoted to recovery LUN status.

For more information about integrity checking, see “Checking integrity” ([page 63](#)).

Using the remote copy feature

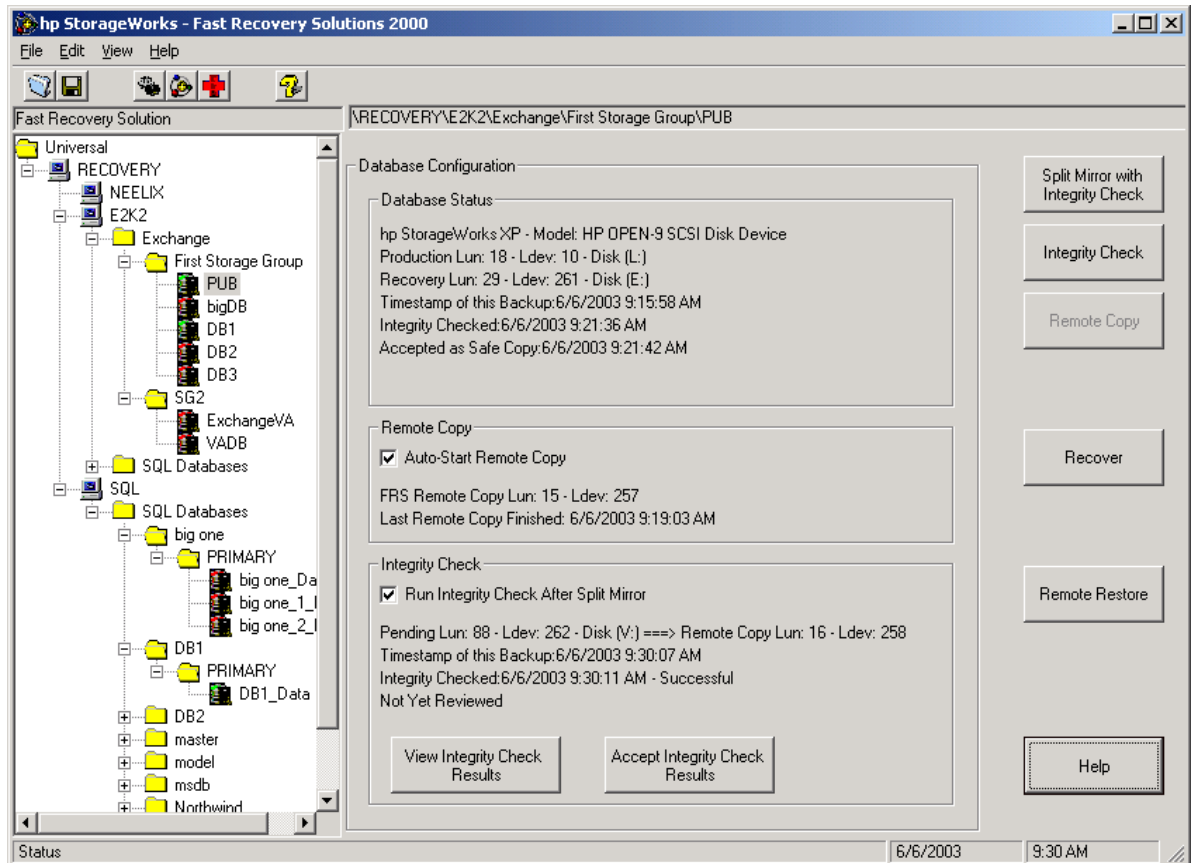
(XP arrays only) HP StorageWorks Continuous Access (CA) software must be installed on the disk array to use the remote copy feature.

For each recovery LUN maintained by FRS, there can be a corresponding remote LUN for disaster recovery purposes. This remote LUN must be created and paired manually by using the Continuous Access software.

After you have established the remote pair manually, FRS will detect it and present expanded features for the maintenance of the remote LUNs on the FRS GUI.

Just as you need to do an initial FRS split mirror backup to the local recovery LUNs, you need to execute an initial FRS split mirror backup to the remote recovery LUNs.

The following example shows the new GUI features that will appear when remote copy is being used.



If you check the **Auto-start Remote Copy** box, at the end of every successful split mirror backup FRS will update the remote copy of that LUN. Unchecking this box enables the **Remote Copy** box, which allows you to resync the remote copy at will, independent of a split mirror backup of the production LUN.

If both the Auto-Start Remote Copy box and the Run Integrity Check after Split Mirror box are checked, events occur in the following sequence:

1. The split mirror backup is done to the local recovery LUN.
2. The integrity check runs automatically after the split mirror backup.
3. The administrator must view and accept the integrity check.
4. After the integrity check has been accepted, the remote copy operation begins.

When the copy is complete, the icon next to the database will again turn green, indicating that it is available for a new action.

When the remote copy is complete, the **Remote Restore** button appears. Now a fast recovery can be executed, if needed, from the remote LUN.

Checking integrity

Before using the integrity check feature of FRS, see “Requirements for integrity checks” ([page 33](#)). There are two integrity check methods:

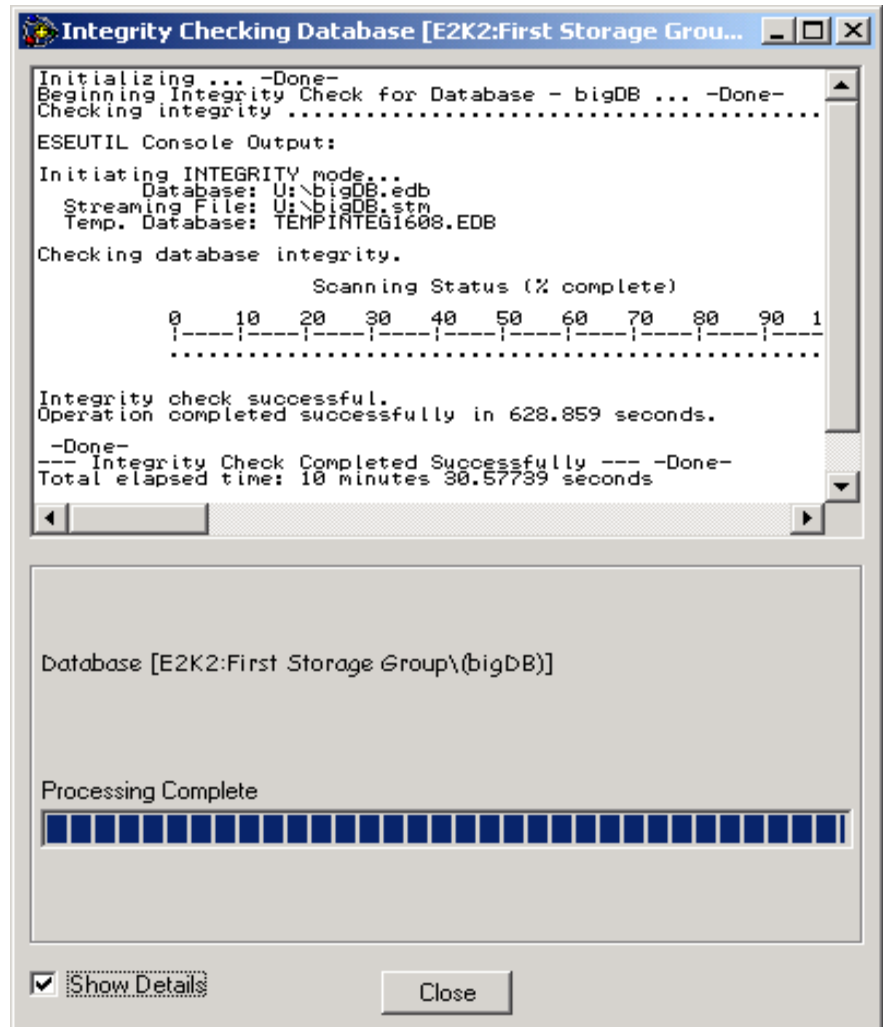
- Automatic integrity check after split mirror backup

This method is known as the “safe copy” method because it retains the previous known good copy of the database. The safe copy of the database is not overwritten until after the integrity check is accepted. This method consumes twice the recovery disk space, as two recovery LUNs are required for each production LUN.

- Manual integrity check independent of split mirror backup

Either method produces an integrity check progress window, as well as an integrity check report that can be viewed by an administrator and accepted.

If the integrity check results are accepted, the GUI will be updated with the information about the integrity check. If you are using the automatic integrity check after split mirror backup, your accepting the integrity check results will display a window alerting you that by accepting, the pending LUN will be promoted to recovery-ready status.



Automatic integrity check after split mirror backup

If the Integrity Check box is checked in the GUI, the integrity check requires twice the disk space to preserve the previous known good copy of the recovery databases. Using this method maintains a safe copy of the database that can be recovered to the production server if needed, while the newest copy of the data is checked for integrity before becoming the recovery-ready copy.

As mentioned, if you are using this method, you must designate additional disk space on the recovery server. For each production LUN that will be managed by FRS in this way, two identically sized LUNs must be assigned to the recovery side. The second recovery LUN is configured exactly like the first.

EVA and XP disk arrays

For EVA and XP disk arrays, the LUN requires an **hpfrs** label.

VA disk arrays

For VA disk arrays, CommandView SDM must be used to create additional business copies.

Manual integrity check independent of split-mirror backup

If the integrity check box is not checked, copies of the database are automatically promoted to recovery-ready status. If you click **Integrity Check**, FRS checks the recovery-ready copy. This method uses only one recovery LUN for each production LUN and does not maintain a known good, recovery-ready copy (the “safe” copy mentioned above) of the database at all times.

Executing a recovery

Regardless of the array type or backup method, the starting point for a database recovery requires that there are backup copies of the databases residing on the recovery server (an initial pair has already been created by using FRS).

Recovery operations can be executed as often as needed, provided there is sufficient time between actions for the database to return to a “not locked” status.

For Exchange 2000 you can choose to execute a recovery with or without log replay.

Exchange 2000 Recovery without log replay

From the FRS main window, select the database to be recovered from the left pane. The Database Configuration section then displays all information about the LUNs for that database. When you click **Recover**, a popup message asks whether log replay is required. Click **No** to decline log replay.

Log replay will be disabled until the next split mirror backup has been completed for that database. Click **OK** to begin recovery without log replay, or click **Cancel** to return to the GUI.

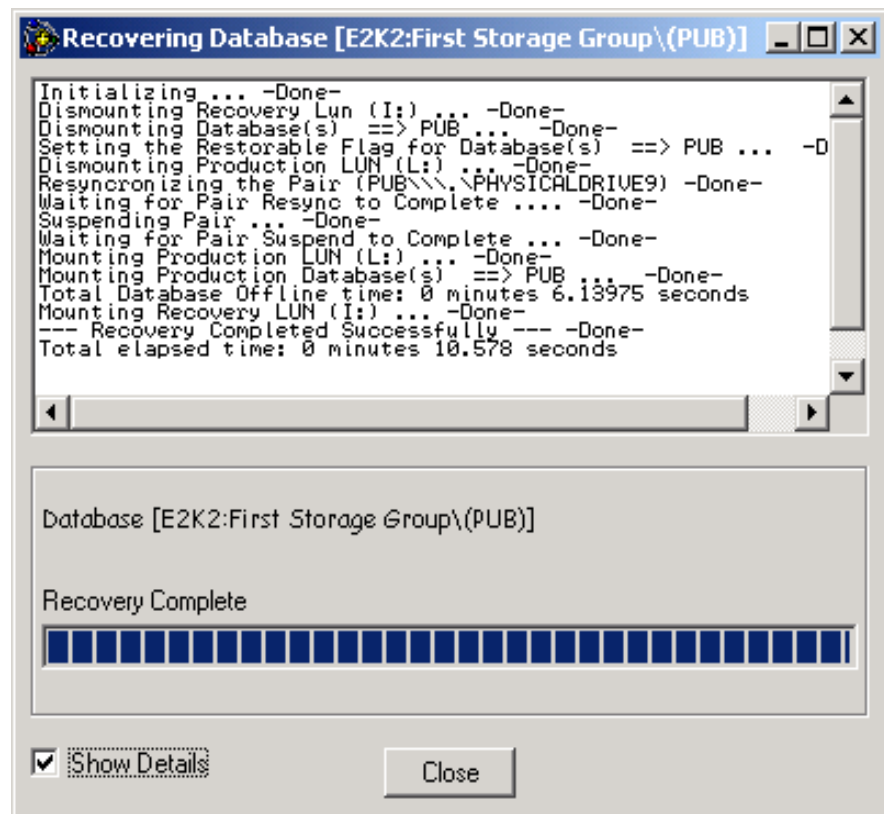
Caution

If multiple databases within a storage group reside on one LUN, then all the databases in that storage group will be replaced with the recovery databases. If no log replay is chosen, the entire storage group is brought back to the point of the last backup. If each database resides on its own LUN, then only the database chosen for recovery will be rolled back to the point of last backup.

59.



In this example, the progress window is shown for the recovery of the database **PUB** of server **E2K2**



When the recovery is complete, you must close the recovery window. When you close the window, the database is available for further backup/recovery/integrity check actions.

Upon completion of the recovery, the Database Configuration section of the GUI changes to reflect the new “restored on:” date. As with backups, recoveries can be performed as often as necessary and can be executed in parallel, if needed.

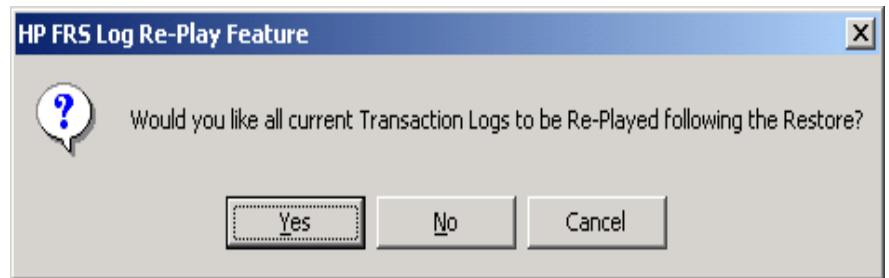
Exchange 2000 Recovery with log replay

From the FRS main window, select the database to be recovered from the left pane. The Database Configuration section then displays information about the production and recovery LUNs for that database.

1. Select the database to be recovered.
2. Click **Recover**.

The **Recover** button is enabled only if a split mirror backup has previously been completed by FRS and if no other actions are in progress for that database.

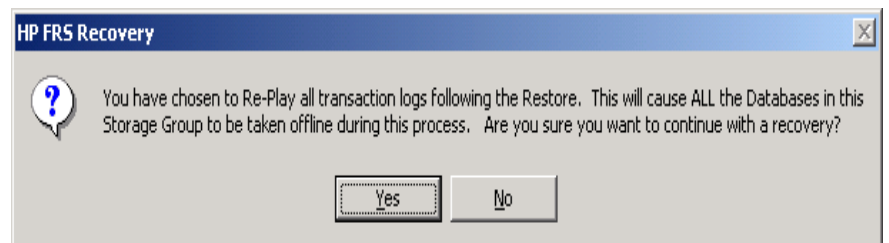
A popup window asks for confirmation.



3. Click **Yes** to confirm that you want to replay the transaction logs.

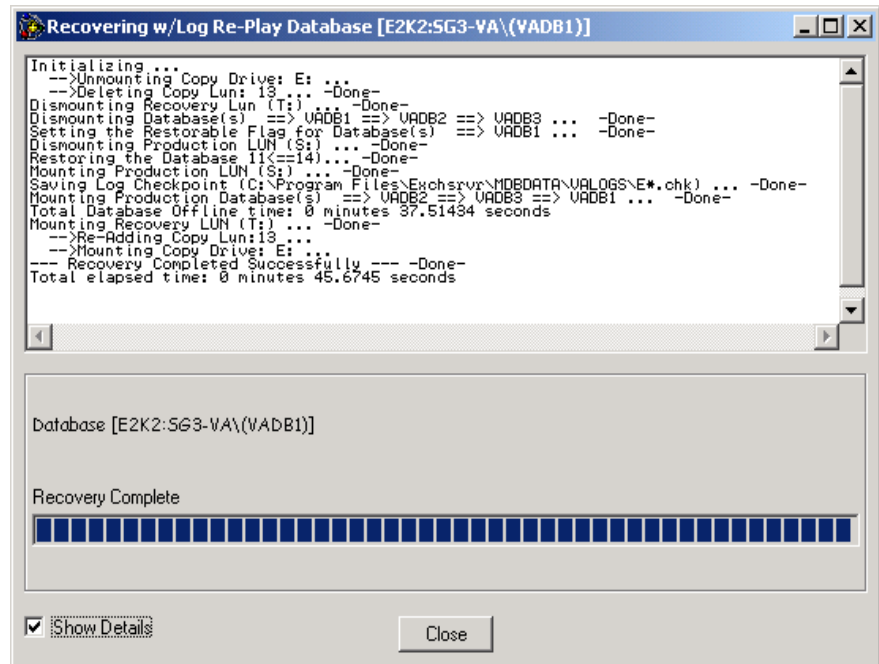
The recovery process causes all databases in the storage group to be dismounted.

A popup window asks for confirmation.



4. Click **Yes** to confirm that you want to dismount all databases and begin the recovery process.

In the following example, the progress of a recovery is shown for database VADB1.



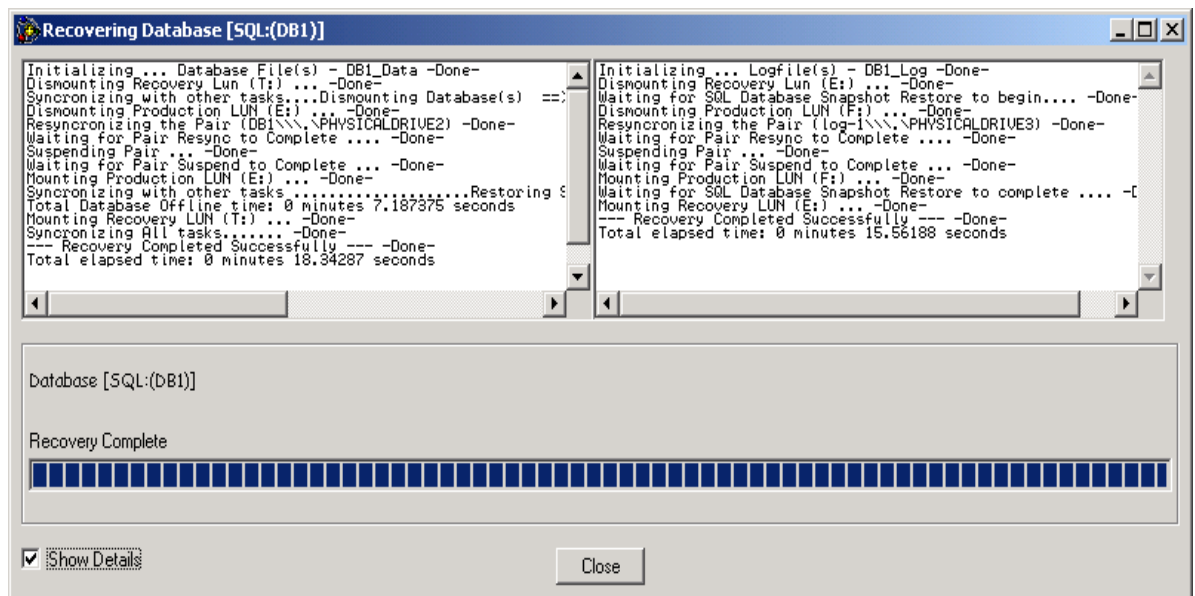
The amount of time required for restoring the database depends on the number of logs to be replayed.

On completion of the recovery, all databases are remounted and access is restored.

SQL 2000 Recovery

From the FRS main window, select the database to be recovered from the left tree. The Database Configuration section then displays all information about the LUNs for that database. Click **Recover** and a progress window appears to show the progress of the recovery.

In this example a SQL 2000 database (DB1), which resides on two LUNs, is recovered. Therefore two progress windows appear. When the recovery is complete, the FRS GUI will contain updated information about the recovery in the Database Configuration section.



Recovery from the local recovery LUN while a remote copy is taking place

If necessary, a recovery can be executed while a remote copy is in progress. Executing a recovery from the local recovery LUN immediately cancels the remote copy in progress, regardless of its current state.

This action leaves the remote copy in an unstable state and so it must be re-created from the original production LUN to make it stable and usable.

Recovery from the remote recovery LUN

If there is a remote LUN, and FRS has created at least one split mirror backup to it, there will be a Recovery From Remote LUN button on the right side of the FRS window.

In the event the local recovery LUN corrupt and a remote recovery is needed, highlight the database that needs recovery and click **Recovery From Remote LUN**.

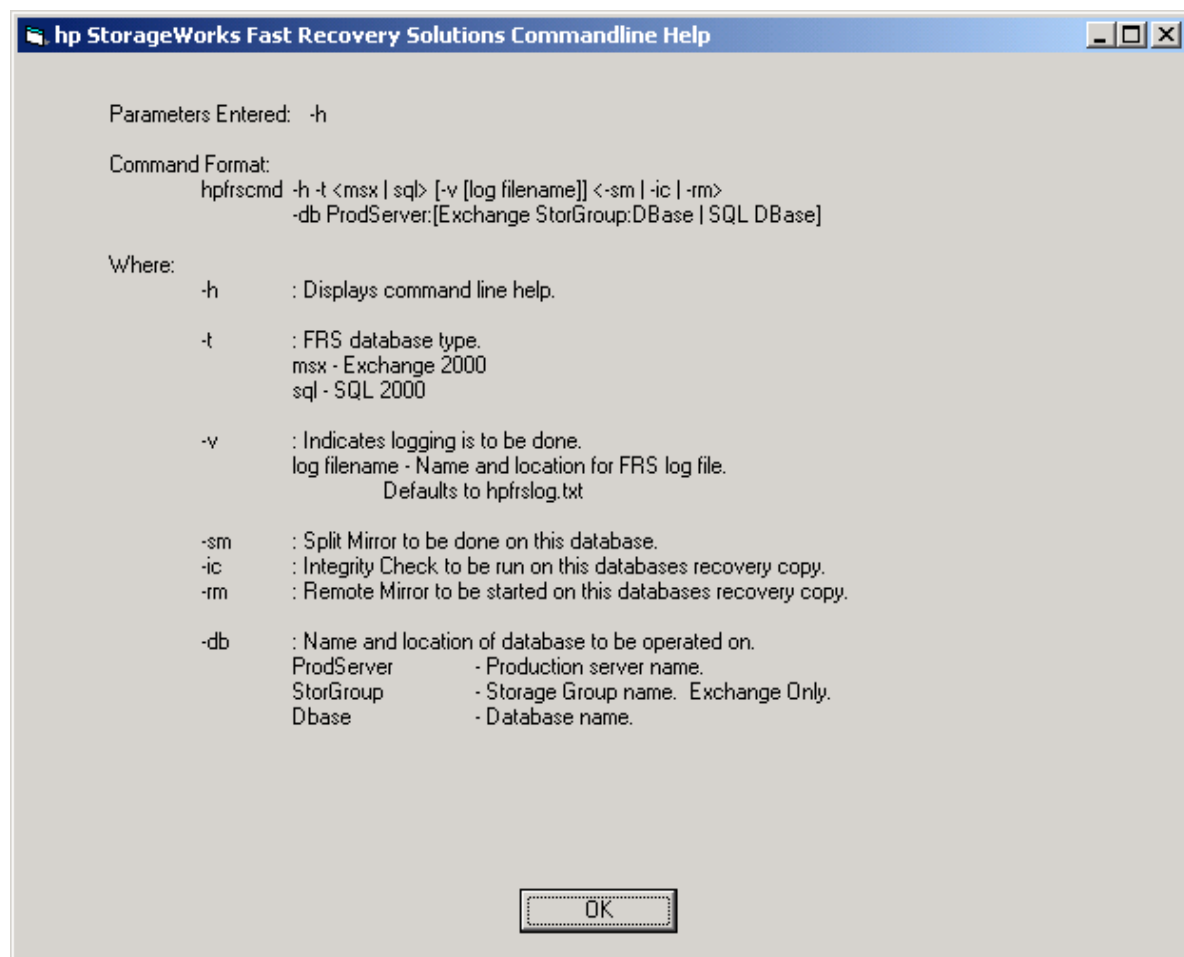
This method of recovery invalidates the local recovery LUN. You will need to do a split mirror backup to the local recovery LUN to make it valid and usable.

Command Line Interface

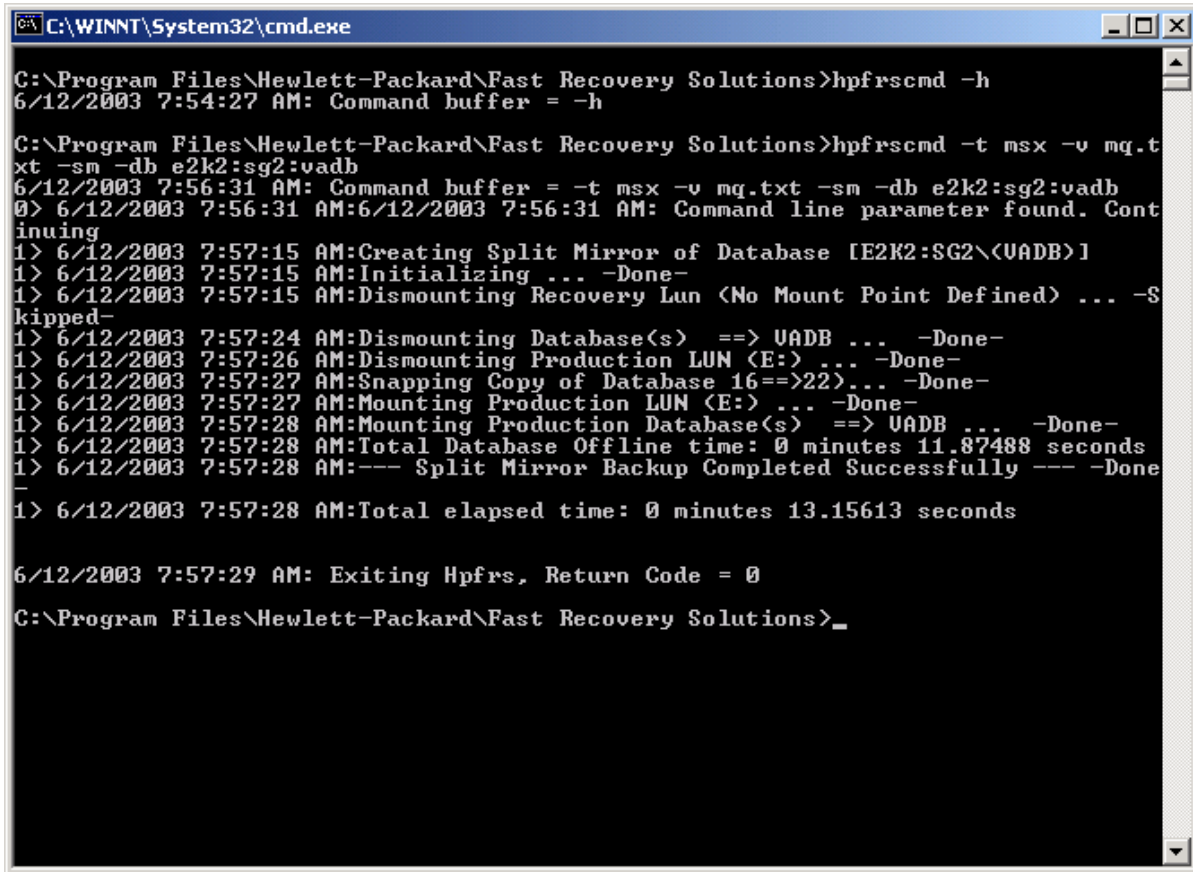
FRS provides command line control of split mirror backups, integrity checks, and remote copies.

At the command prompt, change (using **cd**) to the directory where FRS is located. The default location is **C:\program files\Hewlett-packard\frs**.

hpfrscmd -h displays a help window with all FRS commands.



The following example shows the verbose output of a command line issued split mirror backup on the database **VADB**. This database resides on the server **E2K2** in the storage group **SG2**.



```
C:\WINNT\System32\cmd.exe

C:\Program Files\Hewlett-Packard\Fast Recovery Solutions>hpfrscmd -h
6/12/2003 7:54:27 AM: Command buffer = -h

C:\Program Files\Hewlett-Packard\Fast Recovery Solutions>hpfrscmd -t msx -v mq.txt
-sm -db e2k2:sg2:vadb
6/12/2003 7:56:31 AM: Command buffer = -t msx -v mq.txt -sm -db e2k2:sg2:vadb
0> 6/12/2003 7:56:31 AM:6/12/2003 7:56:31 AM: Command line parameter found. Continuing
1> 6/12/2003 7:57:15 AM:Creating Split Mirror of Database [E2K2:SG2\UADB]
1> 6/12/2003 7:57:15 AM:Initializing ... -Done-
1> 6/12/2003 7:57:15 AM:Dismounting Recovery Lun <No Mount Point Defined> ... -Skipped-
1> 6/12/2003 7:57:24 AM:Dismounting Database(s) ==> UADB ... -Done-
1> 6/12/2003 7:57:26 AM:Dismounting Production LUN <E:> ... -Done-
1> 6/12/2003 7:57:27 AM:Snapping Copy of Database 16==>22)... -Done-
1> 6/12/2003 7:57:27 AM:Mounting Production LUN <E:> ... -Done-
1> 6/12/2003 7:57:28 AM:Mounting Production Database(s) ==> UADB ... -Done-
1> 6/12/2003 7:57:28 AM:Total Database Offline time: 0 minutes 11.87488 seconds
1> 6/12/2003 7:57:28 AM:--- Split Mirror Backup Completed Successfully --- -Done-
1> 6/12/2003 7:57:28 AM:Total elapsed time: 0 minutes 13.15613 seconds

6/12/2003 7:57:29 AM: Exiting Hpfrs, Return Code = 0

C:\Program Files\Hewlett-Packard\Fast Recovery Solutions>
```

If you specify an FRS log text file with the **-v** option, it will be saved in the HP Fast Recovery Solutions directory.

FRS command line entry and the FRS GUI cannot be run at the same time. After you have started an action by command line entry, you cannot open the GUI until the action is complete.

Options

From the View menu, select **Options** to change the following preferences for Maintenance and Recovery operations:

- whether the **Start** button must be clicked before a backup or recovery will start
- whether the backup and recovery actions are followed step by step in the backup/recovery window
- whether the database is automatically remounted in Exchange
- whether the backup/recovery window must be manually closed after an action is complete
- whether to wait for the remote copy to be completed, which displays a progress window if the box is checked

Troubleshooting

This chapter includes the following topics:

- error reporting
- product support information

FRS error messages

This section describes recommended actions for messages, errors, and warnings displayed by FRS during the following operations:

- maintenance
- recovery
- terminating processes
- integrity checks

Maintenance

Error Dismounting the local/remote drive failed. Please close any open files on that drive and select retry to try again, select ignore to ignore the error and continue, or select abort to cancel the operation.

FRS cannot dismount a file system drive if it detects any activity on it. This could cause data inconsistency, so FRS waits until all files on that drive are closed before dismounting the drive. Confirm that all files are closed, and select retry.

If the problem is with the remote drive, confirm that connectivity to the remote machine is intact and that there are no network issues preventing FRS from communicating with the remote server.

Error Mounting the remote drive failed. Please select retry to try again, select ignore to ignore and continue, or select abort to cancel the operation.

FRS cannot remount the drive if the connection to the production server has been lost. Confirm that connections are intact and that the recovery server can ping the production server. Then retry.

Warning Are you sure you want to continue with a split mirror backup?

After the split mirror backup is started, it cannot be stopped without jeopardizing the integrity of the database. Both the recovery and production database being backed up are inaccessible for a short time during this period. If a split mirror backup is initiated when the production database is corrupt, known good recovery databases are overwritten with the corrupt one. (Using the integrity check/safe copy feature of FRS can eliminate this potential issue.)

Warning No LUN's of appropriate size found. Cannot continue.

LUNs must be configured on the recovery server for use by FRS and conform to these criteria:

- the **HPFRS** label
- same size as the production LUNs

If LUNs are available, but they are not the same size as the production LUNs, FRS cannot pair them. Assign more LUNs of the same size as the production LUNs.

Recovery

Error Failure setting the database restore flag. Please select retry to try again.

Failure resetting the database restore flag. Please select retry to try again.

Failure querying the database restore flag. Please select retry to try again.

If FRS cannot communicate with the Exchange server, it cannot manipulate the restore flag. Check connectivity to the production server. Confirm that all Microsoft services are online.

Error This operation cannot be completed. Pair needs to be in suspended state to run recovery.

The **Recovery** button is enabled only if a split mirror backup has been done in the past and the pair has been created using FRS. This error occurs if the pair has been manually split at the disk array.

Error This operation cannot be completed, no recovery LUN available

The **Recovery** button is enabled only if a split mirror backup has been done in the past and the pair has been created using FRS. This error occurs if a pair has been manually deleted at the disk array and then a recovery is attempted.

Message Are you sure you want to continue with a recovery?

After a recovery is started, it cannot be cancelled until the recovery is completed. The production database will be replaced by the recovery-ready database.

Terminating processes

Message Operation cannot be cancelled. . .

Closing either the GUI or the progress window for a split mirror backup or a recovery would cause FRS to leave the database in an unknown state. For this reason, FRS does not allow windows to be closed while these actions are in progress. If you forcibly cancel the process through the operating system (for example, Task Manager), the integrity of the database cannot be guaranteed and FRS and the disk array may have conflicting information about the databases.

Integrity checks

Warning By accepting this integrity check the recovery volume will be replaced by the safe copy volume.

Before accepting the copy, examine the output of the integrity check. Do not accept the integrity check unless you have confirmed that it is a good copy of the database. After the integrity check is accepted, the former

recovery-ready volume becomes the pending copy that is used for the next backup/integrity check.

Warning Activating Automatic integrity checks following a split mirror backup consumes double the disk storage.

Automatic integrity checks require two secondary (copy) volumes for each primary (source) volume. One is the pending copy that is integrity checked. Then after it is accepted as good, it becomes the known good recovery-ready copy. There will now be a second LUN required for the next backup. The recovery-ready copy of the database is never overwritten by the new copy until the new copy has been integrity checked and accepted. In this way, there is always at least one known good recovery-ready copy of the data.

Product support information

For additional information about installing, implementing, or maintaining FRS, contact your HP representative.

Glossary

BC	HP StorageWorks Business Copy XP. Software that creates and maintains local copies of data stored on the disk array. The copies can be used for data duplication, backup, and local disaster recovery.
CA	HP StorageWorks Continuous Access XP. Software that creates and maintains remote copies of data stored on the local disk array. The copies can be used for data duplication, backup, and disaster recovery.
cluster	The concept of linking individual servers physically and programmatically and coordinating communication between them so they can perform common tasks.
DCOM	Windows distributed component object model.
EVA	HP StorageWorks Enterprise Virtual Array.
failover	Process that automatically shifts the workload from one server in a cluster to another server in the event of a failure.
FRS	HP StorageWorks Fast Recovery Solutions.
FRS server	The server where copies of the production database are staged and managed. The FRS server runs the FRS GUI.
LDEV	Logical device. An LDEV is created when a RAID group is divided into pieces according to a selected host emulation mode (that is, OPEN-3, OPEN-8, OPEN-9, etc.). The number of resulting LDEVs depends on the selected emulation mode. The term LDEV is often used synonymously with the term volume.

LUN	Logical unit number. A LUN results from mapping a SCSI logical unit number, port ID, and LDEV ID to a RAID group. The size of the LUN is determined by the emulation mode of the LDEV, and the number of LDEVs associated with the LUN. For example, a LUN associated with two OPEN-3 LDEVs will have a size of 4,693 MB.
LUSE	Logical unit size expansion.
online backup	Backup while Exchange services are still running. There is no interruption in services for backup.
P-VOL	The primary or main volume that contains the data to be copied.
production server	Exchange 2000 or SQL 2000 server.
RAID	Redundant array of independent disks.
recovery server	FRS server. The server where copies of the production database are managed.
S-VOL	Secondary or remote volume. The copy volume that receives data from the primary volume.
Snapclone	Secondary copies of the databases that are created using the EVA storage appliance.
split mirror backup	Also called off-line backup, because it is performed after a normal database shutdown. All data files and control files are consistent to the same point in time. Used in environments where it is possible to take services off-line for short periods every day to do backup.

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